



Idaho State Department of Agriculture
Division of Agricultural Resources

**Kootenai and Bonner Counties
Spokane Valley - Rathdrum Prairie Aquifer
Ground Water Monitoring Results**

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ISDA Technical Results Summary #7

October 2001

Introduction

The Idaho State Department of Agriculture (ISDA) developed the Regional Agricultural Ground Water Quality Monitoring Program to characterize degradation of ground water quality by contaminants leaching from agricultural sources. The ISDA currently is conducting monitoring at eleven regions in Idaho with plans to implement further testing in other areas (Figure 1). The objectives of the program are to (1) characterize ground water quality related to primarily nitrates and pesticides, (2) determine if legal pesticide use contributes to aquifer degradation, (3) relate data to agricultural land use practices, and (4) provide data to support Best Management Practices (BMP) and/or regulatory decision making and evaluation processes.

The ISDA Spokane Valley-Rathdrum Prairie Aquifer regional monitoring project began in 1998 as a five-year project to study the groundwater quality in the area. ISDA's goal is to better understand the impacts of agricultural practices throughout the Rathdrum Prairie Aquifer. To establish this regional monitoring project, ISDA randomly selected domestic wells in the area and coordinated with homeowners to conduct ground water sampling.

Nutrients, common ions, and pesticides were evaluated during the first year (1998) of ISDA's testing. Laboratory results indicated that no domestic wells in the Spokane Valley-Rathdrum Prairie area had nitrate concentrations that exceeded 10 milligrams per liter (mg/L). Low level detections of the pesticides Dacthal (DCPA) and Dichlorobenzoic Acid (2,4-DCBA) were found in three wells during the 1998 testing period. Monitoring during the summer of 1999, 2000, and 2001 consisted of nutrients and common ions. Follow-up pesticide sampling in 1999 was conducted on the three domestic wells where Dacthal (DCPA) and 2,4-DCBA were detected in 1998. Laboratory results indicated that no pesticides were detected. Pesticide sampling will continue in 2002.

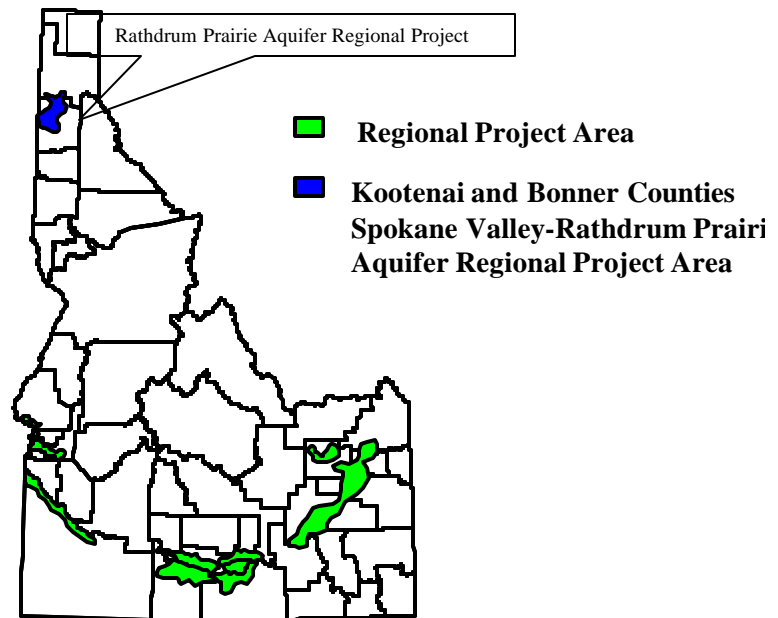


Figure 1. Location of Kootenai and Bonner Counties Rathdrum Prairie Aquifer and other regional project areas.

ISDA currently is working to advise residents and officials of the area to protect ground water quality. Ground water monitoring will continue through the year 2002 to assist with these efforts.

Description of Project Area

The ISDA Spokane Valley-Rathdrum Prairie Aquifer regional project encompasses the northwest portion of Kootenai County and the extreme southern edge of Bonner County (Figure 2). The aquifer was created as a result of the draining of ancient Lake Missoula in Montana when ice dams broke during the last Glacial Age. Course sediments were deposited in thick layers throughout this area (Rathdrum Prairie Atlas, 2000).

Major recharge to the aquifer comes from Pend Oreille and Coeur d'Alene Lakes as well as the surrounding highlands. The aquifer covers 321 square miles (Rathdrum Prairie Atlas, 2000).

The Spokane Valley– Rathdrum Prairie Aquifer was the second aquifer in the nation to be designated as a “Sole Source Aquifer” by EPA in 1978. This was deemed necessary due to the highly permeable overlying soils which could make the aquifer susceptible to contamination (Rathdrum Prairie Atlas, 2000).

The aquifer serves roughly 50,000 - 100,000 people in Kootenai and surrounding counties. There is approximately 20,000 acres of cropland on the prairie, of which the main crops are bluegrass for seed production, fall and spring wheat, and alfalfa. Secondary crop production consists of mint and pinto beans. About 85 to 90% of agricultural ground is irrigated. All irrigated ground is by sprinkler, either wheel lines or pivots (Hogan, 2001).

Ground water depths are greatest in the northern part of the aquifer, but get progressively shallower toward the southern portion of the aquifer. Within ISDA’s project

area, half of the sampled wells have well depths in the 200-400 ft. range which are mostly concentrated in the middle portion of the aquifer (Table 1). The predominant soils for the Rathdrum Prairie consists of gravelly silt loam. This type of soil is favorable for drainage (Hogan, 2001). According to lithologic records from well drillers reports, the majority of the sampled wells in the project area have soil characteristics of sand, gravel, and granite compositions.

Results

Sampling results for the first four years of testing indicate that slight nitrate and pesticide impacts have occurred to the aquifer. Results are summarized and presented in the following sections.

Nitrate

ISDA sampled 40 wells in 1998, 37 wells in both 1999 and 2000, and 36 wells in 2001. Nitrate results within the Rathdrum Prairie Aquifer were detected at levels far below the EPA maximum contaminant level (MCL)* health standard of 10 mg/L for drinking water.

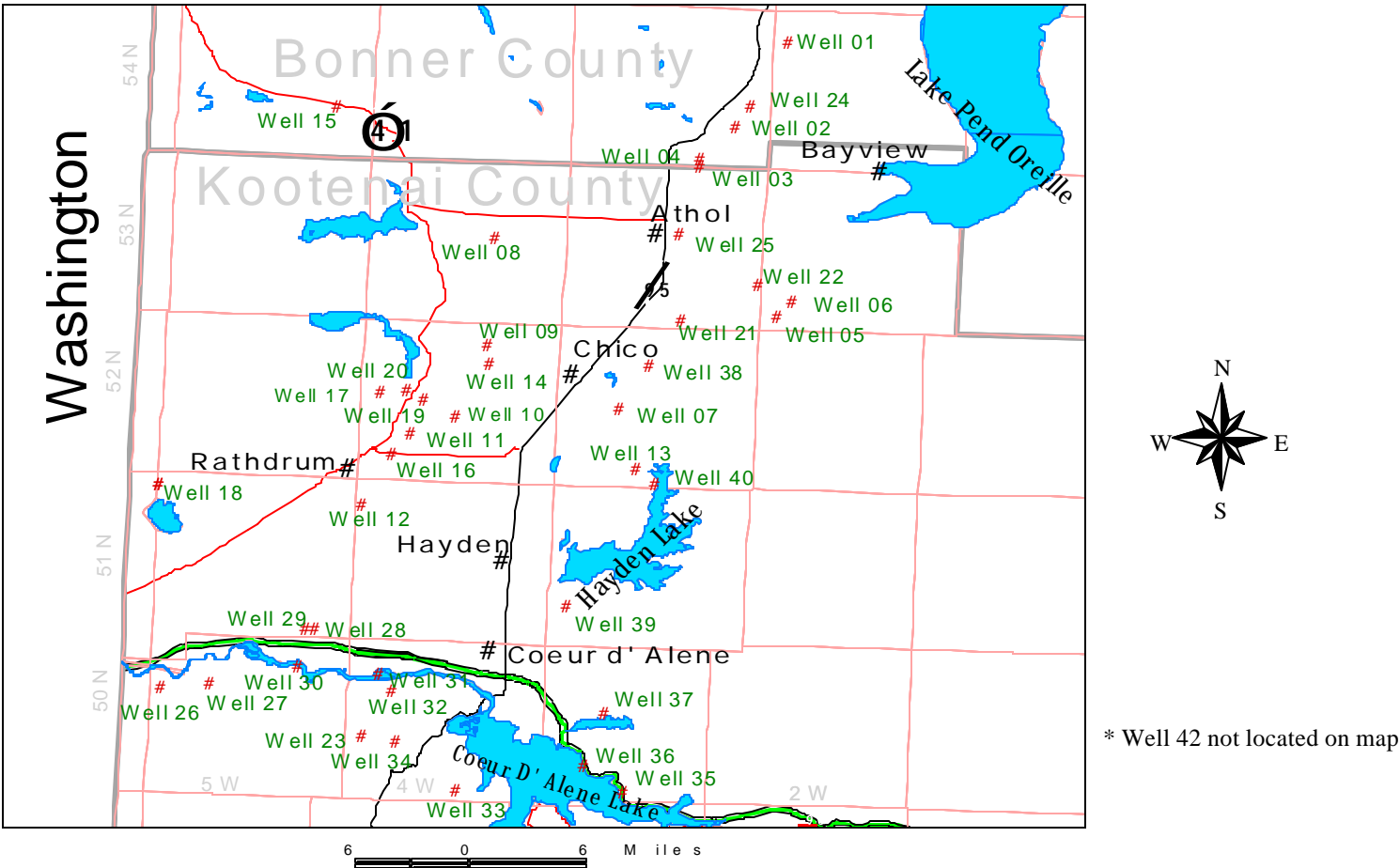


Figure 2. Locations of wells sampled by ISDA in Kootenai and Bonner Counties; labeled by well id.

*MCL - Maximum Contaminant Level as set by the Environmental Protection Agency

Results of ground water sampling in the project area from 1998 to 2001 indicate a slight increase in both the median and maximum nitrate values. None of the wells sampled during the monitoring period have tested at or above the EPA health standard of 10 mg/L nitrate concentrations. Nitrate results indicate that approximately 5% of the sites, per year, had nitrate concentrations equal to or greater than 2.0 mg/L (Table 2). A maximum nitrate concentration of 5.5 mg/L was measured in ground water

in 2001. Wells twelve (2.9 mg/L, 2001) and twenty-nine (5.5 mg/L, 2001) are the two wells consistently greater than 2.0 mg/L each year (Table 3). Those wells which had consistently tested above 2.0 mg/L, for each of the four years, had well depths of greater than 200 ft.

The majority of the nitrate concentrations (40-45%) were detected in wells with total well depths in the 200-400 ft. range (blue highlight). Concentrations greater

Table 1. Well depth and static water level for ISDA Spokane Valley-Rathdrum Prairie Aquifer Regional Project.

Total Well Depth Range (feet)	Total Number of Wells (40 wells)	Median Static Water Level (feet)	Geologic Material
< 100	4 (10.0%)	12	sand / gravel
100-200	5 (12.5%)	98	sand / gravel
200-400	20 (50.0%)	192	sand / gravel
400-600	7 (17.5%)	268	gravel / granite
> 600	3 (7.5%)	300	gravel / granite
Unknown	1 (2.5%)	—	—

Table 2. Nitrate results for ISDA Spokane Valley-Rathdrum Prairie Aquifer Regional Project.

Concentration Range (mg/L)	Summer 1998 30 wells	Summer 1999 30 wells	Summer 2000 30 wells	Summer 2001 30 wells
< MDL (0.050)*	15 (37.5%)	13 (35.1%)	13 (35.1%)	10 (27.8%)
MDL to < 2.0	23 (57.5%)	22 (59.4%)	22 (59.4%)	24 (66.7%)
2.0 to < 5.0	2 (5.0%)	1 (2.7%)	2 (5.4%)	1 (2.7%)
5.0 to < 10.0	0 (0%)	1 (2.7%)	0 (0%)	1 (2.7%)
> 10.0	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Median Value	0.111 mg/L	0.97 mg/L	0.11 mg/L	0.175 mg/L
Maximum Value	3.3 mg/L	5.0 mg/L	3.2 mg/L	5.5 mg/L

Table 3. Nitrate results for wells >5.0 mg/L with respect to well depths for ISDA Spokane Valley-Rathdrum Prairie Aquifer Regional Project.

Well ID #s	1998 Nitrate (mg/L)	1999 Nitrate (mg/L)	2000 Nitrate (mg/L)	2001 Nitrate (mg/L)	Well Depth (feet)
12	2.9	2.9	3.2	2.9	310
29	3.3	5	3	5.5	261

Table 4. Nitrate results (%) in concentration ranges with respect to well depth range for ISDA Spokane Valley-Rathdrum Prairie Aquifer Regional Project (40 wells).

Total Well Depth Range (ft)	% Nitrate Results MDL—2.0 mg/L				% Nitrate Results 2.0—5.0 mg/L				% Nitrate Results 5.0—10.0 mg/L			
YEAR	1998	1999	2000	2001	1998	1999	2000	2001	1998	1999	2000	2001
< 100	4	3	4	4	0	0	0	0	0	0	0	0
100 – 200	6	6	5	5	0	0	0	0	0	0	0	0
200 – 400	18	17	15	15	2	1	2	1	0	1	0	1
400 – 600	7	5	7	7	0	0	0	0	0	0	0	0
> 600	3	3	3	3	0	0	0	0	0	0	0	0
Unknown	0	1	1	0	0	0	0	0	0	0	0	0

Table 5. Pesticide results for ISDA Spokane Valley-Rathdrum Prairie Aquifer Regional Project 1998.

Pesticide Detects	% Number of Detects 30 wells	Range (µg/L)	Health Standard (µg/L)	University of Idaho Estimated Detection Limits (EDL) (µg/L)**
Dacthal	2 (5%)	0.46—0.61	100 (RfD)*	0.016
2,4-DCBA	1 (2.5%)	0.12	0.1 (RfD)*	0.010

than 2.0 mg/L were detected in the 200-400 ft. ranges (Table 4).

Pesticides

Samples were collected at 40 wells in 1998 and sent to the University of Idaho Analytical Science Laboratory (UIASL) in Moscow, Idaho. Testing for various pesticides was accomplished utilizing EPA Methods 507, 508, 515.1, 531.1, and Non-Regulated Analytes with low detection limits. Results in 1998 indicate that approximately 7.5% of the sites (3 wells) had pesticide detections. The compound dacthal (DCPA) was found in two wells at very low concentrations. The compound 2,4-Dichlorobenzoic Acid (2,4-DCBA) was found just slightly above the Reference Dose (RfD)* of 0.10 micrograms per liter (µg/L). (Table 5). The pesticide concentrations are confined to the west-southwest portion of the study area, indicating no widespread contamination. In 1999, follow up monitoring was conducted at the three wells that previously tested positive in 1998. Laboratory results indicated that Dacthal (DCPA) was not detected at or above the estimated detection limit (EDL) of 0.016 (µg/L) or 2,4 DCBA of 0.10 (µg/L) respectively. Pesticide sampling was not conducted in 2000 or 2001, but will be continued in 2002.

Conclusions

The results from this monitoring project indicate that nitrate and pesticide impacts to the Spokane Valley-Rathdrum Prairie Aquifer have been minimal and water quality is good. Nitrate concentrations within the aquifer have been very low.

The median nitrate value increased slightly from 1998 to 2001. The same two wells account for the sites each year with nitrate greater than 2.0 mg/L. Nitrate and pesticide testing results indicate a relative low impact to the ground water quality of this project area.

Recommendations

To determine if current agricultural practices or residential activities are contributing to ground water degradation and to locate other potential contaminant sources, the ISDA recommends continued monitoring in the project area through 2002.

* RfD - EPA Reference Dose for 10 kg Child

** EDL- Estimated Detection Limit set by University of Idaho Analytical Laboratories

The ISDA recommends that the Kootenai-Shoshone and Bonner Soil and Water Conservation Districts lead a response process to create a plan of action to address agricultural ground water protection issues. Due to low concentrations of nitrate, prevention efforts could be a focus through education efforts. The Soil and Water Conservation Districts could work with local agrichemical professionals, landowners, homeowners, and agencies to implement this process and seek funding to support these efforts. The ISDA will support these local partners in seeking funding and implementing a comprehensive program.

References

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